MONASH University

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Submission in response to the NTC discussion paper on
'Barriers to the use of innovative vehicles and motorised mobility devices'.

Introduction

The integration of new vehicles in the transport system has the potential to create friction between existing users including motor vehicle drivers, bicyclists and pedestrians. The reality is however, that the pressures on our urban transport systems show no signs of abating and so greater 'sharing' of the space available for movement will be necessary even under the status quo.

This submission, framed as a think-piece, aims to present some ideas, concepts and potential approaches for addressing how the integration of new vehicles may impact the current mobility paradigm and the regulatory framework in Australia.

As noted by Docherty et al (2018), the issues being considered here relate to a broader paradigm of smart mobility, and are an example of a

> "socio-technical transition (*where*) there are critical questions to be posed in terms of how the transition is managed, and how both the benefits and any negative externalities of change will be governed. …….. This is a critical time ……because technological change is clearly outpacing the capacity of systems and structures of governance to respond to the challenges already apparent. A failure to address both the short and longer-term governance issues risks locking the mobility system into transition paths which exacerbate rather than ameliorate the wider social and environmental problems that have challenged planners throughout the automobility transition."

This document begins by exploring the strategic context within which this socio-technical transition is occurring and then examines the relevance of kinetic energy management and a 'safe systems' approach as components of an alternative paradigm for governing the system. In doing so it presents a challenge to existing thinking about road space allocation to frame it in the broader context of mobility space management and how the established concepts of 'movement' and 'place' could have relevance beyond the 'kerb to kerb' region which attracts most current attention. A conclusions section wraps up the submission.

Strategic Context

Technology

Innovation has been a hallmark of the human existence. Society has embraced technological innovation in many areas over many years. In the transport field, the pace of innovation is being driven by the emergence of new entrepreneurs and business models, societal shifts including a shift to access to transport (e.g. car share, bike share), over private ownership and technological advancement in both software and hardware. In particular, innovations in electric motors and batteries with reduced weight, improved performance and lower production costs, are driving what Adrian Webb (Transport for Victoria) has dubbed the 'lithium revolution'.

Mobility

Any discussion of innovations in personal mobility needs to be placed into the critical context facing mobility in our cities. There is increasing pressure on our urban areas and the pressures of population growth and urban development will continue. Australian cities are struggling to manage growth in a country which is already one of the most heavily urbanized in the world. Melbourne in particular, poised to become Australia's most populous city, has made much of its regular title as the

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world's most liveable city. It usually vies with Vancouver(Canada), the recent winner, and Vienna (Austria) for that title (The Economist, 2018). It is appropriate to note that both Vienna and Vancouver have populations about half that of Melbourne's. In fact, Melbourne is projected to grow by the equivalent of Vancouver or Vienna in the near future.

The challenges associated with maintaining liveability under the pressure of population growth should not be underestimated. All the evidence suggests that much of the low hanging fruit has already been picked and the monoculture of reliance on car based automobility remains a weakness of many urban areas (Sperling and Gordon, 2009). As noted by Docherty et al (2018), for:

> "…… many decades the dominance of the automobile and the existence of siloed approaches to managing transport around distinct transport modes has dominated thinking about the path dependence of planning" that has led to entrenched autodependence.

Moderating growth in vehicle numbers and use will be paramount in enhancing the liveability of our urban areas. While improvements in main line public transport services will be critical, so will the role played by modes other than the private motor vehicle. Maintaining the status quo in the face of the increasing pressures faced by our transport system is not an option. Innovative mobility devices and shared services present opportunities and challenges in the context of managing this socio-technical transition.

Beyond Roads to Mobility

For many people, the road network is an extension of the proverbial sand pit at kindergarten where the need to 'share' is paramount. With our cities getting bigger and more dense, there is going to be a greater need to 'share' the existing, limited network. In more recent years the transport profession has embraced the concept of '*road space* management', in recognition of a strengthening priority for moving people not cars. However road space management is currently framed in terms of 'sharing' the space from kerb to kerb rather than from property line to property line.

There is potential to think more broadly about '*mobility space* management' in the zone from property line to property line on either side of the road. The concept of movement and place, which is becoming embedded in contemporary road network management, would then be relevant. A critical issue is the zone between the property line and the kerb . While in large parts of our urbanised areas that space caters for very, very few people, in others it provides scope for footpath dining and access to adjacent commercial and public land uses that make an invaluable contribution to urban life.

Some jurisdictions allow people to ride bicycles on footpaths, one example of extending the concept of sharing space beyond the kerb and treating that zone for movement. In other jurisdictions footpath cycling is prohibited or strictly limited. This reflects differences in the priority of movement versus safety with specific concern about whether safety will be maintained in a shared use environment with due respect given to the needs of other when riders are operating in that space. However that space is already shared by persons in motorized mobility devices and electric wheelchairs highlighting that motorized devices of some form legally operate in a space which some seek to retain as the exclusive domain of pedestrians. Clearly these are precedents for greater sharing of a more broadly interpreted movement space which deserve careful consideration.

There is potential to draw on the concept of movement and place and extend it to the space between the property line and the kerb. In doing so kinetic energy management is a key consideration.

New vehicles and the relevance of kinetic energy in the context of a 'safe system'

Our regulatory frameworks struggle to cope with vehicle innovation, particularly in relation to light weight personal mobility devices. In that context, kinetic energy management is critical consideration particularly when assessing the potential for injury in the event of a crash (Corben et al, 2004; 2010). Kinetic energy is calculated as mass times velocity (speed) squared. Regular bicycles and racing bikes can generate similar orders of magnitude of kinetic energy as the former is heavier and slower and the latter is faster but lighter.

Contemporary road safety policy is being driven by a 'Safe systems' approach, based on the principle that our life and health should not be compromised by our need to travel and that no level of death or serious injury is acceptable in our road transport network. Safety and risk need to considered in this context. The acceptance of risk is an integral part of human existence. We take risks as a result of the food we eat, the air we breathe and the activities we do, or do not, engage in. Humans do not act to eliminate all risks in their lives. Risk management rather than risk minimisation is central. A Safe System approach does not imply all risk is eliminated but rather rigorously managed.

When considering kinetic energy management in the context of a safe system, a critical issue is the amount of kinetic energy transferred to a human body at the time of a crash Kinetic energy is traditionally managed by limiting speed, careful design of the road side environment, vehicle bodies deforming to dissipate energy and personal protective equipment built into the vehicle such as seat belts and air bags.

Referring back to the kinetic energy model, we can eliminate the risk of death or serious injury by eliminating kinetic energy in an incident. That can be achieved by limiting speed to zero – that is prohibiting movement. That risk elimination approach would then deny the community of the benefits associated with travel and activities undertaken in different places. Clearly a more nuanced approach is required.

Regulatory framework

A fundamental weakness of our current regulatory approach is the prescriptive nature of many standards which make specific reference to a particular type of vehicle. This means that in our current system, a new device must be classified as either a pedestrian, bicycle, motorcycle or a motor vehicle. New types of personal mobility device then need to be shoehorned into one of those categories. Perhaps the clearest example of the challenge of that mindset was the emergence some years ago of the Segway Personal Transporter. It was neither a pair of shoes nor a bicycle and the regulatory framework struggled to work out what to do with it. In retrospect it is a wonder that we don't have a regulatory system based on pedestrians, horses and motor vehicles with mental gymnastics required to creatively classify 'bicycles' as 'horses' under the regulations. Frankly our current regulatory framework is not far removed from that when we contemplate classifying electric scooters as bicycles to determine where and how they can be used.

Key elements of a more robust framework for regulation could involve:

- Distinguishing Personal Mobility *Aids* (required for persons who have a disability which impacts their movement) from Personal Mobility *Devices* (used by persons who do not have a disability) with the maximum speed under power assistance defined for those two vehicle types on the basis of kinetic energy management. Individuals using Personal Mobility Aids could be given access to areas of the movement system, for example between the property line and the kerb, not available to Personal Mobility Devices, but under kinetic energy limits which reflect the place function of that location.
- Framing access to the space from property line to property line, under a mobility space management paradigm, with a distinction drawn between Low, Medium and High Kinetic Energy Zones and their suitability for Mobility Aids or Mobility Devices. In this way Mobility Devices could banned in some locations due to the 'place' value of the space from property line to kerb. Signage could be one way of communicating that to users in areas where Mobility Devices were not permitted.
- Thinking beyond the 'vehicle' itself to defining personal protective equipment (e.g. helmet requirements) as well as rider licensing/permit requirements dependent on the potential kinetic energy and the 'zone' where it operates.

Going forward
Clearly there are many unresolved questions and they can't be answered from an a priori assessment based on the information and data we have access to today. Evidence based policy would be advanced through

- Pilot and demonstration projects which are rigorously evaluated on the basis of rich data, and
- Exploring the potential of innovations in technology to address current and emerging concerns.

There is a critical need, at least in the short term, for pilot and demonstration projects. Embracing demonstration projects of sufficient scale and conducted in different contexts (e.g. inner versus outer city) would enable learnings to be generated to inform policy development.

Ensuring that adequate data is collected to inform policy development is also critical. That data needs to cover use, safety and amenity. The safety dimension alone requires attention because existing road crash and hospital reporting systems do not adequately differentiate even conventional from electric bicycles, let alone the emerging electric scooters or other innovative devices. Again, in the context of a demonstration project of sufficient scale, it would be possible to put in place data capture systems which would allow the necessary information to support informed evaluation.

We also need to be aware of the innovation in technology which opens new possibilities and the innovation cycle is very short. Lime deployed a third generation scooter in about 12 months of its launch model. Hybrid scooters are emerging in Europe where the rider still has to occasionally push manually to get the power assistance. The absence of a throttle makes these similar in concept to an Pedalec electric bicycle which requires the user to be pedaling to get the power assistance. Technology advances would open new opportunities to address operating concerns. For example, motor vehicles are expected to have a speedometer so that motorists can follow speed limits. Why shouldn't we expect other vehicle users, such as those on these innovative devices, to rely on speed information to operate their vehicle safely in for example, a shared use environment like a footpath? Many of the new devices rely on GPS technology which opens the possibility of geofenced limits on operating speed, either by area of operation or location in relation to the whether the device is in say a designated shared use zone. Gyroscopes would provide scope to identify when innovative devices are not parked correctly (e.g. fallen over) and therefore present a risk to visually impaired pedestrians. In that context, operators could be required to take corrective action within a specified response time.

Conclusions
The challenges facing our urban areas require fresh thinking because the existing paradigm is not delivering the outcomes expected or needed by the community. The concepts and ideas presented here need further development but are based on sound principles which would provide a defensible basis for the evolution of policy. Managing this socio-technical transition with clearer consideration of management of both kinetic energy and mobility space requires further evidence to inform policy development. Pilot or demonstration projects, which are rigorously evaluated, would have a valuable role to play and need to be embraced as a priority in order to develop measured policy response to these emerging innovative types of vehicles.

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